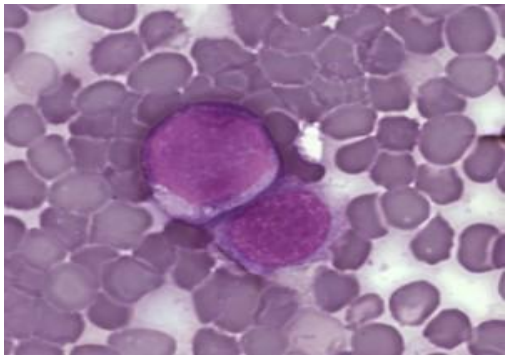
About the Author

April McCarthy is a community journalist playing an active role reporting and analyzing world events to advance our health and eco-friendly initiatives.

Scientists Find That The Human Body Kills Spontaneous Cancers Daily



It takes no more than 100 seconds for the body's immune cells to identify and kill a cancer cell. Immune cells undergo 'spontaneous' changes on a daily basis that could lead to cancers if not for the diligent surveillance of our immune system, Melbourne scientists have found.

A research team from the Walter and Eliza Hall Institute found that the immune system was responsible for eliminating potentially cancerous immune B cells in their early stages, before they developed into B-cell lymphomas (also known as non-Hodgkin's lymphomas). The results of the study were published today in the journal Nature Medicine.

The immune system's basic task is to recognize "self" (the body's own cells) and "nonself" (an antigen–a virus, fungus, bacterium, or any piece of foreign tissue, as well as some toxins). To deal with nonself or antigens, the system manufactures specialized cells–white blood cells–to recognize infiltrators and eliminate them. We all come into the world with some innate immunity. As we interact with our environment, the immune system becomes more adept at protecting us. This is called acquired immunity.

Many mature white blood cells are highly specialized. The so-called T lymphocytes (T stands for thymus-derived) have various functions, among them switching on various aspects of the immune response, and then (equally important) switching them off. Another lymphocyte, the B cell, manufactures antibodies. A larger kind of white cell, the scavenger called the phagocyte (most notably the macrophage), eats up all sorts of debris in tissue and the bloodstream, and alerts certain T cells to the presence of antigens.

”The T-cells basically detect the enemy and then throw grenades at the cancer cell until it blows up,” said immunologist Misty Jenkins from the Peter MacCallum Cancer Centre. T-cells are a type of white blood cell that are key to the body’s immune response. Normally when a T-cell kills the target, the only way you would know that the target has been hit or killed is when it physically starts to die.

However the B-cells bind to a specific antigen and antibodies against these antigens, thus performing the role of antigen-presenting cells (APCs), and to develop into memory B cells after activation by antigen interaction.

This immune surveillance accounts for what researchers at the institute call the ‘surprising rarity’ of B-cell lymphomas in the population, given how often these spontaneous changes occur. The discovery could lead to the development of an early-warning test that identifies patients at high risk of developing B-cell lymphomas, enabling proactive treatment to prevent tumours from growing.

All B-cells, whether healthy or cancerous, have on their surfaces a proteins. To treat patients with the disease, the researchers need to find ways to reprogram their T-cells to find the proteins and attack B-cells carrying it.

Dr Axel Kallies, Associate Professor David Tarlinton, Dr Stephen Nutt and colleagues made the discovery while investigating the development of B-cell lymphomas.

Dr Kallies said the discovery provided an answer to why B-cell lymphomas occur in the population less frequently than expected. “Each and every one of us has spontaneous mutations in our immune B cells that occur as a result of their normal function,” Dr Kallies said. “It is then somewhat of a paradox that B cell lymphoma is not more common in the population.

“Our finding that immune surveillance by T cells enables early detection and elimination of these cancerous and pre-cancerous cells provides an answer to this puzzle, and proves that immune surveillance is essential to preventing the development of this blood cancer.”

B-cell lymphoma is the most common blood cancer in Australia, with approximately 2800 people diagnosed each year and patients with a weakened immune system are at a higher risk of developing the disease.

The research team made the discovery while investigating how B cells change when lymphoma develops. “As part of the research, we ‘disabled’ the T cells to suppress the immune system and, to our surprise, found that lymphoma developed in a matter of weeks, where it would normally take years,” Dr Kallies said. “It seems that our immune system is better equipped than we imagined to identify and eliminate cancerous B cells, a process that is driven by the immune T cells in our body.”

Associate Professor Tarlinton said the research would enable scientists to identify pre-cancerous cells in the initial stages of their development, enabling early intervention for patients at risk of developing B-cell lymphoma.

“In the majority of patients, the first sign that something is wrong is finding an established tumour, which in many cases is difficult to treat” Associate Professor Tarlinton said. “Now that we know B-cell lymphoma is suppressed by the immune system, we could use this information to develop a diagnostic test that identifies people in early stages of this disease, before tumours develop and they progress to cancer. There are already therapies that could remove these ‘aberrant’ B cells in at-risk patients, so once a test is developed it can be rapidly moved towards clinical use.”